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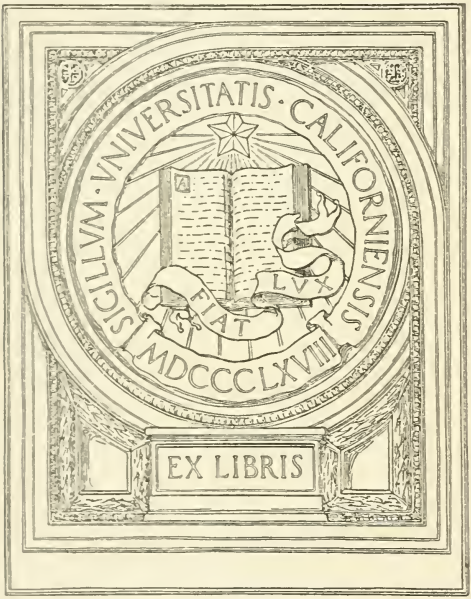

ROBERT ERNEST COWAN

A Catechism of Architecture

-BY-

JOHN GASH, Architect

Wm. Doxey
SAN FRANCISCO
1893

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Dedicated to my Esteemed Friend,

the President of the

San Francisco Chapter of Architects,

by whom the work is endorsed.

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PREFACE.

The subject of Architecture is one in which very few outside the profession seem to take any interest, owing, no doubt, to a general carelessness and a feeling that except to know what doors, windows and a roof are, nothing more is needed; in our intercourse with those outside the profession, we find most people thoroughly deficient in this most pleasing of all studies.

To meet this want, and to stimulate, not only the school boy, the student of history, and the contractor, but the lady or gentleman desiring to build, this catechism is compiled by the author.

OFFICE OF THE SUPERINTENDENT OF PUBLIC SCHOOLS, NEW CITY HALL,

SAN FRANCISCO, Cal., Sept. 5, 1893.

I have examined the manuscript of Mr. J. Gash's pamphlet on Architecture.

The work is simple and practical, and seems well adapted for the general information and knowledge of technical terms needed by boys and young men in architectural evening classes.

JOHN SWETT.
Superintendent.

PACIFIC COAST WOMEN'S PRESS ASSOCIATION,
SAN FRANCISCO, Cal., Sept., 1893.

My Dear Mr. Gash: I have read your little Catechism with interest and instruction. I use the word "little" only in the sense of its brevity, not of its matter. It is clear, concise and simple. I think it fills a long felt want.

I hope the Catechism will be published. There are thousands of women to whom the technical names used in architecture are as Greek. To such, as well as to young students, your explanations would indeed be a boon.

Wishing for the book and its author complete success,

I am sincerely yours,

NELLIE BLESSING EYSTER.

A CATECHISM OF ARCHITECTURE.

STYLES OF ARCHITECTURE.

Chapter I.

Q. What is architecture?

A. The art of building.

Q. What is meant by the orders of architecture?

A. The style of columns used in the ancient temples of Greece and Rome.

Q. How many orders are there?

A. Five; the Tuscan, Doric, Ionic, Corinthian and Composite.

Q. Into how many parts is an order divided?

A. Three; the column, pedestal and entablature.

Q. How many parts has the pedestal?

A. Three; the base, die and cornice.

Q. Into how many parts is the column divided?

A. Three; the shafts, base and capital.

Q. Into how many parts is the entablature divided?

A. Three; the cornice, frieze and architrave.

Q. Into how many parts is the cornice divided?

A. Three; the crown moulding, facia or corona, and architrave.

Q. From what are the heights of the several parts taken?

A. From the diameter of each column at base.

Q. What are the heights of the different columns?

A. The Tuscan, 7 diameters; Doric, 8; Ionic, 9; Corinthian, 10; Composite, 11.

Q. What are the principal styles of architecture?

A. The classic, or ancient style; the Gothic, or modern style.

Q. How are architectural buildings divided?

A. Into three; the church, or sacred style; the civil, or commercial style; the domestic, or home style.

Q. What are the more modern styles called?

A. The Italian, the Byzantine, and the Renaissance.

Q. What is the basis of the Gothic style?

A. The Gothic arch, which has the base of an equilateral triangle for the width of the opening.

Q. What are known as the different styles of Gothic architecture?

A. The Norman, the early English, and the perpendicular style.

ARCHITECTURAL AUTHORS.

Chapter II.

Q. Who are the principal writers on classic architecture?

A. Vignoli, Gwilt and Sir Wm. Chambers.

Q. Who on Gothic architecture?

A. Parker, Pugen and Brandon.

Q. Who on the general history of architecture?

A. Ferguson, Gwilt and Richardson.

ORDERS OF ARCHITECTURE.

Chapter III.

Q. How will you know the Tuscan order?

A. The columns are plain, with plain capital and base. The entablature is also plain.

Q. Why is it called the Tuscan order?

A. Being first used in Tuscany, Italy; hence called the Tuscan order.

Q. How will you know the Doric?

A. The columns are plain, with plain capital and base, the entablature having projecting faces, called trigliefs, with drops called gutta, in imitation of drops of rain.

Q. Why is it called Doric?

A. Because used by the Dorians, the early inhabitants of Greece, about 400 years B. C.

Q. How do you know the Ionic?

A. The column is fluted, and has volutes in the capital resembling the curls of ladies' hair as then worn.

Q. Why called Ionic?

A. After the people of a part of Greece called Ionians, who tried to improve on the Doric order.

Q. How is the Corinthian column formed?

A. Its column is fluted, with capital and base.

Q. How is the capital formed?

A. With cap called abacus and leaves of the acanthus plant, or parsley leaves, surrounding what is called the bell of the capital.

Q. How is the entablature divided?

A. Into cornice and frieze, which is decorated with figures of animals, sacrifices, wars, etc., so that all may read, there having been no printing in those days.

Q. Why called the Corinthian order?

A. The design is supposed to have been invented by one Callimacus, but was generally used in the city of Corinth, then in its glory; hence was called the Corinthian order.

Q. To whom was the order devoted?

A. To the temples of Venus, Flora, Proserpine, and the nymphs of fountains, because of the flowers, foliage and volutes with which it is adorned.

MOULDINGS.

Chapter IV.

Q. What are mouldings?

A. The putting together of certain parts for ornaments, and to reflect light and shade on buildings to create artistic effect.

Q. How many mouldings are there?

A. Eight.

Q. How many figures in arithmetic?

A. Nine.

Q. How many notes in music?

A. Seven.

Q. Name the figures or digits in arithmetic.

A. 1, 2, 3, 4, 5, 6, 7, 8, 9.

Q. Name the notes in music.

A. Do, re, mi, fa, sol, la, si.

Q. Name the mouldings in architecture.

A. The filet, bead, torus, scotia, ovola, or quarter round, cima recta, cima reversa, cavetto.

DOORS AND WINDOWS.

Chapter V.

Q. What are the principal openings to a house called?

A. Doors and windows.

Q. What are the parts of a door called?

A. The sides are called stiles, the top and bottom, rails, and the center parts are called panels; the lock, hinges and threshold.

Q. What is the transom light?

A. The light over a doorway, separated from the door by what is called a transom bar.

Q. What are the principal parts of a window called?

A. The sash, and the glass, which weighs 16, 21 or 26 ounces to a square foot.

Q. What are the parts of a sash?

A. The two stiles, the top and bottom rail, the bars, and the meeting rail, where two rails meet in the middle of the window.

Q. What is the pulley stile?

A. That part where the pulleys and cords are set to raise the windows up and down.

Q. What are the pockets?

A. Where the weights are closed in from view.

Q. What are the parts of a window frame called?

A. The pulley stile, parting bead, stop bead (inside), staff bead, window stool.

Q. What is the parting bead?

A. The small bead that prevents the sashes from touching each other as they pass up and down.

Q. What is the stop bead?

A. The bead that is put inside to keep the sashes from falling in.

Q. What is the staff bead?

A. The bead on the outside that keeps the sash from falling out.

Q. What is the window stool?

A. The lower part of frame on which the sashes rest.

BRICK WORK.

Chapter VI.

Q. What is brick work?

A. The art of laying brick.

Q. What is the size of a brick?

A. Eight and one-half by two and one-half by three and one-half inches.

Q. What is meant by bond in a brick wall?

A. Tying the front and back side of a wall together.

Q. How many sorts of bonds are there?

A. Three; the English, American and Flemish bond.

Q. What is the English bond?

A. When every second course is all headers and all stretchers.

Q. What is the American bond?

A. Four courses of stretchers and one of headers.

Q. What is the Flemish bond?

A. When every second course is a header and a stretcher.

Q. What is meant by header and stretcher?

A. A brick laid in a wall lengthwise is called a stretcher, and laid crossways of wall is called a header.

Q. What are joints in brick work?

A. The mortar spaces between brick.

Q. How many kinds of joints are usually known in brick work?

A. Three; the flush joint, the struck joint and raised joint.

Q. How many brick are laid by a bricklayer in a day?

A. 1,200 to 1,500.

Q. What is the general thickness of brick walls?

A. Four, thirteen, seventeen and twenty-four inches.

Q. How many bricks to a cubic foot?

A. Twenty.

Q. Give name of bricklayer's tools.

A. A trowel, a plumb-rule, a level, a square, a rod or pole, a pair of compasses, a hod and ladder.

Q. What is fire brick?

A. A sort of hard burnt brick, made from fire clay, used in lining furnaces and fire places, by reason of their resisting heat.

MASON WORK.

Chapter VII.

Q. What is masonry?

A. The art of building with stone.

Q. What are the different styles of masonry usually called?

A. Roman, or rubble work; Ashler, cut or dressed work.

Q. What is Roman work?

A. Stones, of uneven shape, laid without regard to courses.

Q. What is rubble work?

A. Stones, of uneven sizes, laid in courses of about 18 inches wide.

Q. What is Ashler?

A. Stones dressed to an even length and width.

Q. What is cut stone work?

A. Masonry dressed to a square or rectangular shape and fine-hammered on face.

Q. What are quoins?

A. Dressed stones set at angles or corners of buildings.

Q. What is an arch?

A. A circular opening over a door or window?

Q. What is a keystone?

A. The highest stone in an archway, which keeps the other stones in place.

Q. How is masonry measured?

A. By the solid perch?

Q. How much is a perch of masonry?

A. Sixteen and one-half feet long, one foot high, and one foot six inches thick.

IRON WORK.

Chapter VIII.

Q. What is iron?

A. A metal dug out of the earth, and much used in building construction.

Q. How many kinds of iron are there?

A. Three: pig iron, wrought iron and cast iron.

Q. What is pig iron?

A. Iron in its natural state, after being melted in the furnace.

Q. What is wrought iron?

A. Cast iron refined.

Q. What is cast iron?

A. Melted iron run into moulds.

Q. What color is iron?

A. A deep gray.

Q. What is the weight of iron?

A. Four and one-half pounds to a cubic inch.

Q. What is sheet iron?

A. Wrought iron hammered our very thin, and used in boilers; then called boiler iron.

Q. What is steel?

A. Iron tempered to a great hardness.

LEAD.

Chapter IX.

Q. How is lead used in building?

A. In roof covering, in gutters and conductors, in plumbing and soldering.

Q. What is solder?

A. A mixture of lead and tin.

Q. What is sheet lead?

A. Lead run on a table to sheets of various thicknesses.

Q. What are the other metals used in building?

A. Copper and zinc.

SLATING.

Chapter X.

Q. What is slate?

A. A sort of mineral used in the covering of roofs of buildings.

Q. Wherein does it differ from stone?

A. It is found in layers that are easily split into thin pieces of various sizes.

Q. What are the instruments used in quarrying slate called?

A. Slate knives, bars and wedges?

Q. Where are the slate quarries found?

A. Bangor, Wales; Vermont, and Bangor, Me., U. S. Also very fine slate quarries in the south of Ireland, and a few in Scotland.

PLUMBING.

Chapter XI.

Q. What is plumbing?

A. The art of arranging bath rooms, wash-bowls, sinks and water-closets in a building to make it healthy and convenient.

Q. What are the names of the several pipes used in plumbing?

A. The supply pipe, the waste pipe, soil pipe and vent pipe.

Q. What is the supply pipe?

A. That which conveys water from the outside to the several rooms in the building, and is generally made of galvanized iron.

Q. What is the waste pipe?

A. That which carries away all waste water from building into sewer, and is generally 2-inch iron pipe.

Q. What is the soil pipe?

A. That which conveys all refuse and waste from the water-closets to sewer, and is generally 4 inches in diameter, and made of cast iron.

Q. What is a vent pipe?

A. A pipe of cast iron, running from the water-closet or sewer to roof.

Q. What is a sewer?

A. An underground opening of brick or earthenware pipe, to convey all refuse from building to some outside place, called a cess-pool, etc.

Q. What is a trap?

A. A curved, bent piece of pipe, used in waste and soil pipes to prevent the return of impure air or gas into buildings.

Q. What is a tank?

A. A square or circular vessel for holding water in large quantities, usually set on roofs to supply water to a boiler.

Q. What is a boiler?

A. A circular vessel made of galvanized iron or copper, to hold heated water for baths, wash-bowls, sinks, etc.

Q. How is water heated in a boiler?

A. From hot-water-back in range or stove, and connected with boiler.

Q. How is hot and cold water in boiler at same time?

A. Hot water rises to upper part of boiler, while cold water sets in lower part.

Q. What is the cause?

A. The hot water being lighter, rises to the top, as does oil on water, and is thence conveyed to the different rooms.

Q. How are explosions in boilers by over hot water prevented?

A. By a vent pipe running through top of boiler to within a foot of bottom. through which cold water is conveyed into boiler.

Q. What is soldering?

A. The connecting of lead or iron pipes together by solder.

Q. What is solder?

A. A mixture of lead and tin, used for connecting piping, etc.

Q. What are the names of the tools used generally by plumbers?

A. The soldering-iron, the shave-hooks, ladle, pliers, pipe-holder, solder pot, blast furnace, wrenches, etc.

Q. What are the openings into baths, sinks and wash-bowls called?

A. Bibs, faucets, water-cocks.

PLASTERING.

Chapter XII.

Q. What is plastering?

A. Coating walls with mortar.

Q. What is mortar?

A. Material made of lime, sand and hair, in suitable proportions.

Q. How many barrels of lime go to 100 yards of plaster?

A. One and one-half barrels.

Q. How much sand?

A. One and one-half tons.

Q. How much hair?

A. Eighteen pounds.

Q. What is meant by lathing?

A. Strips of wood nailed to studding to hold the mortar by what are called keys.

Q. What is the length of a lath?

A. Four feet long, by one and one-half inches wide, and one-quarter inch thick.

Q. How many laths in a bundle?

A. 250, weighing 100 pounds.

Q. How many laths cover 100 yards?

A. 1,500, set three-eighths of an inch apart.

Q. What is meant by breaking joints?

A. Setting ends of laths out of line after every tenth lath.

Q. How is the second or putty coat made?

A. Of select lime and plaster of Paris, in suitable quantities.

Q. How much of each to 100 yards?

A. Three-quarters of a barrel of select lime and 125 pounds of plaster.

Q. How much sand to a cubic foot?

A. 117 pounds of river sand, and 100 pounds of coarse sand.

Q. What is the weight of a cubic foot of lime?

A. Fifty-three pounds.

Q. How many cubic feet in a barrel of lime?

A. Two and three-quarters.

Q. What is the size of a barrel of lime?

A. Twenty-eight inches high, fifteen inches in diameter.

Q. What is meant by stucco work?

A. Cornices and ceilings, and other panel decorations, put on with plaster of Paris and select or diamond lime.

Q. What is meant by floated work?

A. Three-coat work, being so called from using a plain, flat board, called a float, with which to make the surface smooth and even.

Q. What are screeds?

A. Strips of even thickness, set four or five feet apart, to give plastering an even surface and thickness.

Q. What are the names of plasterer's implements?

A. The trowel, hand-float, darby and mould.

Q. What is the trowel?

A. A steel plate, about four inches wide and eight inches long, used for spreading the mortar.

Q. What is the darby?

A. A board nine inches square, one-half inch thick, with a round piece nailed on the back for a handle, and which is used to hold the mortar, being held by the left hand, while with the trowel in the right the mortar is spread.

Q. What is the mould?

A. A form cut out of tin in whatever shape a cornice is required to be run, which being nailed to a wooded board with handle, is run along the soft stucco to bring out the desired shape of cornice.

Q. How is plaster measured?

A. By the square yard, half of the openings being allowed.

Q. How is stucco corner measured?

A. The girt of cross-sections being taken and measured at so much per foot.

Q. How many laths put on count a day's work?

A. 1,800 to 2,000.

Q. How many yards of rough plaster, and how many two-coat work make a day's work?

A. 180 to 200 of brown coat, and 100 to 125 of putty work.

FRAMING.

Chapter XIII.

Q. What is framing?

A. The art of putting pieces of timber together to form a structure.

Q. What is studding?

A. The sticks of the outer walls or partitions of a house.

Q. What are joists?

A. The timbers set to sustain the flooring and roof.

Q. What are headers and trimmers?

A. The timbers set round an opening, such as a fireplace or stair-hole.

Q. What are rafters?

A. The timbers which are used to support the roof.

Q. What are trusses?

A. The framing of large roofs on which the rafters set.

Q. What are the several parts of a truss usually called?

A. The tie-beam, the king-post, the queen-post, the purlins, the pole-plate, the ridge, the collar-brace, the angle-tie and dragon-tie.

Q. What is the tie-beam?

A. The timber that goes from one side wall to the other.

Q. What is the king-post?

A. The center post that extends to the ridge.

Q. What are the queen-posts?

A. Those set on either side of the king-post.

Q. What are the purlins?

A. Those timbers that extend from truss to truss on which the rafters rest.

Q. What is the pole-plate?

A. The plate on which the end of the jack-rafters rest.

Q. What is the ridge?

A. The board that catches the end of jack-rafters at the top.

Q. What is the collar-brace?

A. The piece which joins the two rafters together about center, where no truss is used.

Q. What is the angle-tie?

A. A piece which joins the two plates together at the angle of the building.

Q. What is the dragon-tie?

A. That tie which joins the angle-tie to the plates.

Q. What are the names of the different trusses?

A. The railroad truss, the king-post truss, the hammer-beam truss, and the scissor truss.

Q. What is the railroad truss?

A. A truss generally used on railroads, formed with planks and an iron rod bolted at both ends of planks, and extending under planks, and resting on an iron piece acting as a sort of fulcrum.

Q. What is a king-post truss?

A. A truss joined by a tie-beam and post called king-posts, and having rafters called principals, on which purlins and jack-rafters rest.

Q. What is a hammer-beam truss?

A. A truss with a plate called a hammer, one-half resting on walls and caught by foot of rafter, and the other part supported by a bracket, on which pieces called uprights rest to support rafters.

Q. What is a scissor truss?

A. A truss with cross braces in the form of a pair of common scissors.

PAINTING.

Chapter XIV.

Q. What is painting?

A. The covering of wood, iron, etc., with a liquor called paint.

Q. Of what is paint composed?

A. Of white lead, oil and dryers.

Q. What are the best oils used?

A. Linseed oil, boiled or raw.

Q. How is paint applied?

A. By brushes made of hog's hair and camel's hair.

Q. Name other painter's tools.

A. A pallet, a scraping knife, earthen pots for colors, cans for turpentine, a grinding stone and muller.

Q. What is meant by priming?

A. It is the first coat of white lead and oil put on.

Q. What is flat-work?

A. The finish coat with oil and turpentine, in about two parts turpentine to one of oil.

Q. What is linseed oil?

A. Oil obtained from linseed; principally from the Baltic Sea and Bombay.

Q. What is white lead?

A. The metal lead, changed by the vapor of carbolic acid into what is called white lead.

Q. What is distemper?

A. Finishing with whiting and water, and with glue size.

Q. What is tinting?

A. Different colors used with whiting, for coloring walls.

Q. What is putty?

A. A mixture of whiting and linseed oil, used in setting glass in sashes, the process being called glazing.

Q. What are pigments?

A. Different earths or minerals used in coloring.

Q. What is fresco painting?

A. Decorating walls and ceilings with water-colors or oil in different tints.

Q. What is graining?

A. Imitating different woods with tints, called also combing or marbleizing.

Q. What is varnishing?

A. The application of a gum of a transparent nature, used for giving a smooth or glossy surface to painting and graining, such as copal varnish, elastica, etc.

Q. What is rubbing-down work?

A. Smoothing the painted surface with sand or emery-paper.

Q. What is staining?

A. A substitute for painting, to imitate the natural wood, which is also, generally, sized and varnished.

Q. What is sizing?

A. A mixture of boiled glue and water, made very thin.

Q. What is sanding?

A. Throwing fine white sand on outside paint work, while wet, to give it a stone-like appearance.

Q. What is gilding?

A. Covering wood or iron with gold-leaf.

Q. How thick is gold-leaf?

A. About one thirty-thousandth part of an inch.

Q. How is it kept?

A. In books measuring about three and one-third inches by three inches.

PAPER-HANGING.

Chapter XV.

Q. What is paper-hanging?

A. The art of covering walls with paper of different patterns.

Q. How is paper sold?

A. By the roll.

Q. How many yards in a roll?

A. A roll is twelve yards long, twenty inches wide; hence, one yard long covers five square feet.

STAIRS.

Chapter XVI.

Q. What are stairs?

A. Steps leading from one floor to another, either above or below.

Q. Name the principal parts of stairs.

A. The step and riser, the newel-post, the rail, the baluster, called also banister.

Q. What is the balustrade?

A. One name for the baluster, newel-post and rail.

Q. What is the newel-post?

A. The post at the lower landing of the stairs.

Q. What is the rail?

A. That cap on top of balusters to keep them in place.

Q. What is the baluster?

A. A post set on each step, and fastened to rail for protection.

Q. What is the tread?

A. That part on which the foot rests as you ascend.

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Q. What is the riser?

A. That part set between two steps.

Q. How many sorts of stairs are there generally known?

A. Three ; the geometrical, the bracket stair, and the dog-railed stairway.

Q. What is called the geometrical stair?

A. One whose opening is down the center, or, as it is called, an open newel.

Q. What is the bracket style?

A. One which has an opening or well, and is supported by landings or carriages.

Q. What is a dog-rail stairway?

A. One which has no opening or well-hole.

Q. What is the ramp?

A. The bent part of rail near newel-posts.

Q. What is a curtail step?

A. The step at ground floor which curves round the newel-post, like a cur-dogs tail ; hence the name.

MEMORANDUMS.

One brick weighs ..... 5 lbs.
One barrel lime weighs..... 200 "
One gallon liquor weighs..... 10 "
One sq. ft. pine, board measure, weighs 5 "
One keg nails weighs ..... 108 "
One thousand laths weigh..... 400 "
One cubic foot sand weighs..... 150 "

One lime barrel measures 2 ft. 4 in. by 1 ft. 3 in. diameter.

One gallon oil, one pint dryers, ten pounds white lead, will paint ten yards, two coats, or three yards, three coats.

One acre, 208.71 feet square.

One quarter-section, 2,638 feet square.

One section, 5,276 feet square.

One cubic foot	Alcohol	weighs.....	49	lbs.
" "	Brandy	"	57	"
" "	Coal	"	90	"
" "	Granite	"	165	"
" "	Ice	"	57	"
" "	Ivory	"	114	"
" "	Lime	"	50	"
" "	Marble	"	170	"
" "	Milk	"	64	"

One cubic foot		Oil weighs	57 lbs.
"	"	Porcelain weighs	166 "
"	"	Salt weighs	133 "
"	"	Sandstone weighs	140 "
"	"	Slate weighs	167 "
"	"	Snow weighs	6 "
"	"	Soap weighs	56 "
"	"	Water weighs	62 "
"	"	Wine weighs	62½ "

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